

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-20, drawn to "A composition comprising at least one carbohydrate dissolved in at least one solvent", classified in class 428, subclass 375.
 - II. Claim 21-34, drawn to "A method of making a composition comprising dissolving at least one carbohydrate in at least one solvent", classified in class 264, subclass 165.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the process can be used to make a different product, such as a profiled non-fibrous article through solution casting.
3. Restriction for examination purposes as indicated is proper because all these inventions listed in this action are independent or distinct for the reasons given above and there would be a serious search and examination burden if restriction were not required because one or more of the following reasons apply:

- (a) the inventions have acquired a separate status in the art in view of their different classification;
- (b) the inventions have acquired a separate status in the art due to their recognized divergent subject matter;
- (c) the inventions require a different field of search (for example, searching different classes/subclasses or electronic resources, or employing different search queries);
- (d) the prior art applicable to one invention would not likely be applicable to another invention;
- (e) the inventions are likely to raise different non-prior art issues under 35 U.S.C. 101 and/or 35 U.S.C. 112, first paragraph.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a invention to be examined even though the requirement may be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected invention.

If claims are added after the election, applicant must indicate which of these claims are readable upon the elected invention.

Should applicant traverse on the ground that the inventions are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

4. During a telephone conversation with Bryan Rosiejka on 11 March 2008 a provisional election was made with traverse to prosecute the invention of Group 1, Claims 1-20. Affirmation of this election must be made by applicant in replying to this Office action. Claim 21-34 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Objections

6. Claim 3 is objected to because of the following informalities: DP should be spelled rather than abbreviated. Appropriate correction is required.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) The invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the U.S.

8. Claims 1, 2, 8, 12, 13, & 16 are rejected under 35 U.S.C. 102(b) as being anticipated by DuCharme, et al. {DuCharme1} (US 6096258 A).

Regarding Claims 1, 2, 13, & 16, DuCharme teaches with sufficient specificity a cellulose solution that is thermoplastic in that it is solid at room temperature and melts at about 65-°C ({DuCharme} C6:L41-43) for extrusion and regenerating into a film ({DuCharme} Claim 1 & C3:L42-52). Regarding Claim 8, the cellulose is dissolved in N-methylmorpholine-N-oxide (NMMO) ({DuCharme} C3:L17-26). Regarding Claim 12, the amount of cellulose can range from 10- to 20-% and the amount of water can range from 5- to 15-% ({DuCharme} C3:L26).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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10. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 1-3, 5-7, 9, 10, & 13 are rejected under 35 U.S.C. 102(b) as anticipated by Chen (US 4999149 A) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chen (US 4999149 A) in view of Nicholson, et al. {Nicholson} (US 5597587 A).

Regarding Claims 1, 2, & 5, Chen teaches by example AVICEL PH 101 cellulose dissolved in a zinc chloride aqueous solution for producing solvent-spun cellulose fiber or film ({Chen} Claim 1). The ratio of cellulose is approximately 15% weight per volume ({Chen} C7:L11-15). Applicant teaches a similar example using AVICEL PH 101 with a cellulose concentration of 18% ({Applicant} [0056]). While Chen is explicitly silent regarding the thermoplastic properties of the composition, it appears that since the concentrations of cellulose in aqueous zinc chloride in both examples would exhibit the same thermoplastic properties inherently.

Regarding Claim 3, the DP of the cellulose is between 100 and 3000 ({Chen} C4:L11). The use of this solvent provides a high tensile strength, alkaline stable, solvent-spun cellulose fiber ({Chen} C4:L8-11). Regarding Claims 6 & 7, the amount of zinc chloride is approximately 55- to about 80-% weight ({Chen} Claim 1). Regarding Claim 9, pre-wetting the cellulose with water and a solution of zinc chloride is taught

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because it reduces the number of solid particles when it is added to dry cellulose that can clog the spinneret ({Chen} C5:L3-23).

In the alternative that Chen's specific example for the AVICEL PH 101 cellulose composition is not thermoplastic, Nicholson provides motivation to make a cellulose viscose composition thermoplastic because it eliminates the need for derivatizing cellulose and eliminates the generation of toxic gasses and sulfur compounds associated with the viscose process ({Nicholson} C3:L16-21). Thermoplasticity of the composition is related to the viscosity of the cellulose solution, whose concentration of cellulose can range from 10- to 20-% ({Nicholson} C6:L15-20). One of ordinary skill in the art would have recognized that the viscosity would be affected by the concentration of cellulose and degree of polymerization. Regarding Claim 10, as Chen teaches that pre-wetting affects the number of particles in the composition, varying the concentration of water and zinc chloride solution to optimize the number of particles would have been well within the range of ordinary skill in the art.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to make the composition comprising aqueous zinc chloride and cellulose {Chen} a thermoplastic cellulose viscose {Nicholson}. Making a cellulose viscose composition thermoplastic is advantageous because it eliminates the need for derivatizing cellulose and eliminates the generation of toxic gasses and sulfur compounds associated with the viscose process ({Nicholson} C3:L16-21). Thus, it would have been obvious to combine Chen with Nicholson to obtain the thermoplastic carbohydrate viscose.

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12. Claims 3, 9, 10, & 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over {DuCharme1} (US 6096258 A) as applied to Claim 2 above, in view of DuCharme, et al. {DuCharme2} (US 5603884 A).

As discussed above, DuCharme1 teaches carbohydrate cellulose dissolved in NMMO that is thermoplastic at room temperature, but is silent regarding degree of polymerization, pre-wetting, and fibers.

DuCharme2 teaches thermoplastic fibrous and film dope solutions from cellulose, NMMO, and water ({DuCharme2} C3:L53-59 & Claim 1). Regarding Claim 3, the cellulose material is a degree of polymerization higher than about 900 units ({DuCharme2} C7:L31-38). Regarding Claim 9, a second portion of cellulose material can be wetted with NMMO before being mixed with non-wetted cellulose material to form slurry ({DuCharme2} C4:L1-7 & C4:L24-35). Then the slurry is mixed with solvent and water to form the dope. These process steps appear to meet Applicant's definition of "pre-wetting" since the cellulose material is wetted before being dissolved ({Applicant} [0043]). Regarding Claim 10, the amount of water is about 5- to about 30-% and the amount of cellulose carbohydrate is about 16-% ({DuCharme2} C4:L29-36). Using equal weight of water and solvent is a matter of optimizing how much energy is required to mix the fibers and how well the cellulose slurry dissolves to form dope ({DuCharme2} C4:L7-19). Regarding Claim 13, the viscose can be made into fibers and films ({DuCharme2} C3:L57-58).

At the time of the invention, it would have been obvious to use cellulose of a particular degree of polymerization and pre-wet the cellulose fibers {DuCharme2} with

the thermoplastic carbohydrate solution {DuCharme1}. The motivation to process specific celluloses in such a way would have been to make fiber or film that have a dimensional stability that is "stretchy" rather than "stiff" ({DuCharme2} C3:L65-68). Thus, it would have been obvious to combine DuCharme1 with DuCharme2 and wet the cellulose carbohydrate fibers.

13. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over {DuCharme1} (US 6096258 A) as applied to Claim 2 above, in view of von der Eltz, et al. {Eltz} (US 5609676 A).

As discussed above, DuCharme1 teaches cellulose dissolved in NMNO that is thermoplastic at room temperature, but is silent regarding using recycled cellulose fiber.

Eltz teaches recycling cotton fiber waste into reusable viscose ({Eltz} C5:L49-67). Viscose is a cellulose material dissolved and regenerated often with NMNO ({Eltz} C1:L4-12). Recycling materials is advantageous because it reduces the amount of waste textiles ({Eltz} C1:L21-24).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to recycle cellulose material {Eltz} with the thermoplastic carbohydrate solution {DuCharme1}. Recycling materials is advantageous because it reduces the amount of waste textiles ({Eltz} C1:L21-24). Thus, it would have been obvious to combine DuCharme1 with Eltz and use recycled cellulose fiber as the carbohydrate raw material.

14. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (US 4999149 A) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chen (US 4999149 A) in view of Nicholson, et al. {Nicholson} (US 5597587 A) as applied to Claim 2 above, in view of von der Eltz, et al. {Eltz} (US 5609676 A).

As discussed above, Chen teaches identical commercial AVICEL PH 101 cellulose dissolved in zinc chloride at a substantially similar concentration to that taught by Applicant. Nicholson provides additional motivation why to make a dissolved cellulose composition thermoplastic. Both are silent regarding the use of recycled cellulose fiber.

Eltz teaches recycling cotton fiber waste into reusable viscose ({Eltz} C5:L49-67). Viscose is a cellulose material dissolved and regenerated often with NMMO ({Eltz} C1:L4-12). Recycling materials is advantageous because it reduces the amount of waste textiles ({Eltz} C1:L21-24).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to recycle cellulose material {Eltz} with the thermoplastic carbohydrate solution {Chen}. Recycling materials is advantageous because it reduces the amount of waste textiles ({Eltz} C1:L21-24). Thus, it would have been obvious to combine Chen with Eltz or Chen and Nicholson with Eltz and use recycled cellulose fiber as the carbohydrate raw material.

15. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over DuCharme, et al. {DuCharme1} (US 6096258 A) as applied to Claim 1 above, in view of Kosak, et al. {Kosak} (US 3186858 A) and {Woods} (*Encyclopedia of Chem. Tech.*).

As discussed above, DuCharme1 teaches cellulose dissolved in NMMO that is thermoplastic at room temperature, but is silent regarding pumping carbon dioxide gas into an extruder to cause foaming of a carbohydrate/solvent solution.

Kosak teaches cellulose viscose regeneration ({Kosak} C1:L10-12). Carbon dioxide is introduced to the viscose dope to induce foam ({Kosak} C2:L14-21). This procedure is used to make porous structures, and is advantageous because it eliminates another step in foam formation from a foaming agent ({Kosak} C2:L20-23).

Kosak is silent regarding pumping the gas into the extruder. Woods teaches the injection of additives in the extruder prior to spinning ({Woods} Page 272, Paragraph 8-Page 273, Paragraph 1). Pumping gas into the extruder appears to be functionally equivalent to injecting gas into the extruder. Carbon dioxide is furthermore taught as a means of inflating viscose fibers ({Woods} Page 262, Paragraphs 2-5).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to pump carbon dioxide into a carbohydrate/solvent solution {Woods} to foam the viscose {Kosak} with the thermoplastic carbohydrate solution {DuCharme1}. The motivation would have been to produce a porous article ({Kosak} C2:L6-7) or to inflate viscose fibers ({Woods} Page 262, Paragraphs 2-5). Thus, it would have been obvious to combine DuCharme1 with Kosak and pump carbon dioxide into an extruder and foam a carbohydrate-cellulose solution.

16. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (US 4999149 A) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chen (US 4999149 A) in view of Nicholson, et al. {Nicholson} (US 5597587 A) as applied to Claim 2 above, in Kosak, et al. {Kosak} (US 3186858 A) and {Woods} (*Encyclopedia of Chem. Tech.*).

As discussed above, Chen teaches identical commercial AVICEL PH 101 cellulose dissolved in zinc chloride at a substantially similar concentration to that taught by Applicant. Nicholson provides additional motivation why to make a dissolved cellulose composition thermoplastic. Both are silent regarding pumping into an extruder carbon dioxide gas to foam the thermoplastic cellulose viscose.

Kosak teaches cellulose viscose regeneration ({Kosak} C1:L10-12). Carbon dioxide is introduced to the viscose dope to induce foam ({Kosak} C2:L14-21). This procedure is used to make porous structures, and is advantageous because it eliminates another step in foam formation from a foaming agent ({Kosak} C2:L20-23).

Kosak is silent regarding pumping the gas into the extruder. Woods teaches the injection of additives in the extruder prior to spinning ({Woods} Page 272, Paragraph 8-Page 273, Paragraph 1). Pumping gas into the extruder appears to be functionally equivalent to injecting gas into the extruder. Carbon dioxide is furthermore taught as a means of inflating viscose fibers ({Woods} Page 262, Paragraphs 2-5).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to pump carbon dioxide into a carbohydrate/solvent solution {Woods} to foam the viscose {Kosak} with the thermoplastic carbohydrate solution {Chen}. The motivation

would have been to produce a porous article ({Kosak} C2:L6-7) or to inflate viscose fibers ({Woods} Page 262, Paragraphs 2-5). Thus, it would have been obvious to combine Chen with Kosak or Chen and Nicholson with Kosak and pump carbon dioxide into an extruder and foam a carbohydrate-cellulose solution.

17. Claims 14-16 & 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over {DuCharme1} (US 6096258 A) in view of {DuCharme2} (US 5603884 A).as applied to Claim 13 above, in further view of King, et al. {King} (US 4287251 A).

As discussed above, DuCharme1 teaches cellulose dissolved in NMMO that is thermoplastic at room temperature. DuCharme2 teaches using a similar composition for fibers. Both are silent regarding the use of the fibers in spunbonded and plied nonwovens.

King teaches disposable absorbent composite structures of plied nonwovens including spunbonded rayon webs ({King} C3:L8-30). Alternating layers of spunbonded rayon and webs polyethylene or polypropylene are envisioned ({King} C3:L44-51). Spunbond rayon is used because it gives excellent results in surgical aid articles and is soft, pliable, and comfortable ({King} C4:L39-65).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to make plied spunbond rayon nonwoven absorbent composite structure {King} with the thermoplastic carbohydrate solution {DuCharme1} formed into a fiber {DuCharme2}. The motivation to use spunbond rayon is because it gives excellent results in surgical aids and is soft, pliable, and comfortable ({King} C4:L39-65). Thus, it

would have been obvious to combine DuCharme1 and DuCharme2 with King and produce plied spunbond carbohydrate fiber nonwoven absorbent composite structures for medical articles.

18. Claims 14-16 & 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen (US 4999149 A) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chen (US 4999149 A) in view of Nicholson, et al. {Nicholson} (US 5597587 A) as applied to Claim 2 above, in view of King, et al. {King} (US 4287251 A)

As discussed above, Chen teaches identical commercial AVICEL PH 101 cellulose dissolved in zinc chloride at a substantially similar concentration to that taught by Applicant. Nicholson provides additional motivation why to make a dissolved cellulose composition thermoplastic. Both are silent various article structures and processes of making them.

King teaches disposable absorbent composite structures of plied nonwovens including spunbonded rayon webs ({King} C3:L8-30). Alternating layers of spunbonded rayon and webs polyethylene or polypropylene are envisioned ({King} C3:L44-51). Spunbond rayon is used because it gives excellent results in surgical aid articles and is soft, pliable, and comfortable ({King} C4:L39-65).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to make plied spunbond rayon nonwoven absorbent composite structure {King} with the fiber or film from the thermoplastic carbohydrate solution {Chen}. The motivation to use spunbond rayon is because it gives excellent results in surgical aids

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and is soft, pliable, and comfortable ({King} C4:L39-65). Thus, it would have been obvious to combine Chen with King or Chen and Nicholson with King for plied spunbond carbohydrate fiber nonwoven absorbent composite structures for medical articles.

19. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over over {DuCharme1} (US 6096258 A) as applied to Claim 2 above, in view of DuCharme, et al. {DuCharme2} (US 5603884 A).as applied to Claim 13 above, with evidence from Jangala, et al. {Jangala} (*Making Rayon Fiber*).

As discussed above, DuCharme1 teaches cellulose dissolved in NMMO that is thermoplastic at room temperature, but is silent regarding cellulose crystal structures.

Jangala teaches that the crystal structure of regenerated cellulose is an allotropic modification of cellulose I, designated as cellulose II ({Jangala} Page 6). Conditions of making the fiber effect the molecular order and thus properties of the fiber. It appears that the cellulose product taught by Ducharme is thus inherently a cellulose II structure.

20. Claim 17 is rejected under 35 U.S.C. 102(b) as anticipated by Chen (US 4999149 A) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chen (US 4999149 A) in view of Nicholson, et al. {Nicholson} (US 5597587 A), with evidence from Jangala, et al. {Jangala} (*Making Rayon Fiber*).

As discussed above, Chen teaches identical commercial AVICEL PH 101 cellulose dissolved in zinc chloride at a substantially similar concentration to that taught by Applicant. Nicholson provides additional motivation why to make a dissolved

cellulose composition thermoplastic. Both are silent regarding the crystalline structure of the cellulose article.

Regarding Claim 17, it appears that the crystalline product of viscose process is cellulose II ({Jangala} Page 6). Chen's process used to make article is substantially similar to Applicant's. The cellulose material is pre-wet with both water and the solvent. The temperatures also overlap, with Chen extruding at between 40- and 120-°C and Applicant at 210-°F or 99-°C ({Chen} Claim 1 & {Applicant} [0051 & 0056]). Chen's specific example of extrusion is conducted at 60-°C ({Chen} C6:L40). Thus, it appears that the cellulose extrudate is inherently a cellulose II structure.

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892 for additional references.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SHAWN R. HUTCHINSON whose telephone number is (571) 270-1546. The examiner can normally be reached on 7 AM to 5 PM, M-H.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Shawn R. Hutchinson/
Examiner, Art Unit 1794

/Carol Chaney/
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